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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/845,985	04/30/2001	Benjamin Chaloner-Gill	N19.12-0047	2942

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EXAMINER

RUTHKOSKY, MARK

ART UNIT	PAPER NUMBER
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1745

DATE MAILED: 11/29/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/845,985

Applicant(s)

CHALONER-GILL ET AL.

Examiner

Mark Ruthkosky

Art Unit

1745

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 13 September 2004.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-4,6-10,12-21 and 48-54 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-4,6-10,12-21 and 48-54 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 09 October 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All   b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## DETAILED ACTION

### *Specification*

The objection under 35 U.S.C. 132 to the amendment filed 10/9/2003 for introducing new matter into the disclosure has been overcome by the applicant as claim 11, which included a compound with the formula  $\text{Fe}_3(\text{PO}_4)_2$ , has been canceled.

### *Claim Rejections - 35 USC § 112*

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-4, 6-10, 12-21 and 48-54 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In the claims, the phrase, "less than about" is indefinite as the limitation, "less than" describes a definite maximum value, while the word "about" contradicts that value. Further in the claims, the phrase, "greater than about" is indefinite as the limitation; "greater than" describes a definite minimum value while the word "about" contradicts that value. The same reasoning is applied to the phrase "at least about" in claim 53 As shown in the MPEP, section 2173.05(b), section (a), the phrase "at least about" is held as indefinite. The same reasoning is applied to the phrase, "less than about."

Claim 17 is indefinite as it includes a lithium metal phosphate with the formula  $\text{Li}_x\text{FePO}_4$  and the value of x is not defined. As the value of x is unknown, the claim is indefinite.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-4, 6, 7, 10, 12, 16, 17, 19-21 and 48-50 are rejected under 35 U.S.C. 102(b) as being anticipated by Kamauchi et al. (US 5,538,814.)

The instant claims are to a collection of particles comprising a crystalline composition with a phosphate anion and a lithium cation; the collection of particles has an average particles size of less than about 1000 nm. Kamauchi et al. (US 5,538,814) teaches a lithium secondary battery with a lithium cobalt phosphate active material with an average particle size of 10 nm to 20  $\mu\text{m}$  (see claims 1-14, claim 3.) Other metals may be added to the active material (col. 4, lines 10-65.) Lithium, cobalt and nickel are included in the active material of example 4. The material may be crystalline or amorphous (see col. 6, lines 1-20.) The material may be of the formula  $\text{LiCoPO}_4$  with Fe substituted for the Co (see column 4, lines 15-55.) With regard to claims, the phrase “at least about” is considered to include points the range of 10 nm to 20  $\mu\text{m}$ . Thus, the claims are anticipated.

Claims 1-4, and 6 are rejected under 35 U.S.C. 102(b) as being anticipated by Griffith (EP 031,223.)

Griffith (EP 031,223) teaches a collection of particles comprising a crystalline composition with a phosphate anion and a lithium cation; the collection of particles has an

average particles size of less than about 1000 nm. Crystalline calcium-lithium –phosphate with an average diameter between about 50 nm and 1 micron is noted. The addition of other metals is noted at the top of page 7. The crystals are formed by a collection of particles (see claim 9 for example.) Thus, the claims are anticipated.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 13-15 and 51-53 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kamauchi et al. (US 5,538,814.)

Kamauchi et al. (US 5,538,814) teaches a lithium secondary battery with a lithium cobalt phosphate active material with an average particle size of 10 nm to 20  $\mu$ m (see claims 1-14.) Other metals may be added to the active material (col. 4, lines 10-65.) The material may be crystalline or amorphous (see col. 6, lines 1-20.) The reference does not teach that the collection of particles has essentially no particle with a diameter greater than about 3 times or 5 times the average particle size; or that at least 95 percent of the particles have a diameter greater than about 40 percent and less than about 160 percent of the average diameter. It would be obvious to one of ordinary skill in the art at the time the invention was made to prepare a collection of particles for an electrode material of Kamauchi having a greater number of particles as close in size to the desired average diameter as possible, as the average diameter has been shown to be

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critical to the invention. One of ordinary skill in the art has the knowledge, based on Kamauchi, to prepare particles of selected sizes by pulverizing the materials. Further, one of ordinary skill in the art would be motivated to choose specific particles of the average diameter for the electrode, as particles of this diameter are taught to increase the capacity of the electrode (col. 5, lines 30-35.) The grinding of larger particles will provide particles in the nanometer scale range.

Claims 8-9 and 18 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Goodenough et al. (US 5,910,382), and further in view of Kamauchi et al. (US 5,538,814.)

Goodenough et al. (US 5,910,382) teaches cathode materials for a lithium secondary battery including  $\text{LiFePO}_4$  and  $\text{LiFe}_{1-x}\text{Mn}_x\text{PO}_4$ , where  $x$  is between 0 and 1. The anode is lithium metal or a lithium intercalation material (see col. 1.) The reference is silent to the size of the active material particles. Kamauchi et al. (US 5,538,814) teaches a lithium secondary battery with a lithium cobalt phosphate cathode active material with an average particle size of 10 nm to 20  $\mu\text{m}$  (see col. 5, line 25 to col. 6, line 20 and claims 1-14.) Other metals may be added to the active material including iron and manganese (col. 4, lines 10-65.) The electrode material is pulverized into particles having an average size of 10 nm to 20  $\mu\text{m}$ . It would be obvious to one of ordinary skill in the art at the time the invention was made to prepare the cathode materials of Goodenough et al. (US 5,910,382) to a size of less than 1000 nm as the small size provides and increased surface area and dispersion through the electrode which increases the capacity of the positive electrode as shown by Kamauchi et al. (US 5,538,814.)

Claim 54 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bodiger et al. (US 5,849,827.)

Bodiger et al. (US 5,849,827) teaches a collection of particles of inorganic powders such as aluminum phosphate. The particles have a mean particle diameter of 1-50 nm (see claims 1-9.) The particles are claimed to be finely divided inorganic powders (claim 9.) The reference is silent to the crystallinity of the material and does not suggest that the material is either crystalline or amorphous. It would be obvious to one of ordinary skill in the art at the time the invention was made to prepare the powder either as a crystalline material or as an amorphous material as the material will provide a significant reduction in burning times in a molding composition regardless of the state of crystallinity. One of ordinary skill in the art would recognize that the crystallinity of the material will not affect the properties of the composition. The artisan would have found the claimed invention to be obvious in light of the teachings of the references.

### ***Response to Arguments***

Applicant's arguments filed 4/12/2004 have been considered but they are not persuasive.

With regard to the rejection under 35 U.S.C. 112 2<sup>nd</sup> paragraph, the claims incorporate the phrases, "less than about" and "greater than about." The phrases are indefinite as the limitations, "less than and greater than" describe a definite minimum and maximum value, while the word "about" contradicts that value. The applicant argues that the claims are clear to one of ordinary skill in the art. The applicant cites that the precision of a number is not limited by the phrases, "less than", "greater than" or "at least" with regard to support in a disclosure. While this may or may not be true, 35 U.S.C. 112 2<sup>nd</sup> paragraph requires a claim to distinctly claim the subject matter which the applicant regards as his invention. As shown in the MPEP, section 2173.05(b), the phrase "at least about" is held as indefinite where there is close prior art and

nothing in the specification, prosecution history or prior art to provide an indication of what range of specific activity is covered by the term “about,” with the MPEP citing Amgen Inc. vs. Chugi Pharmaceutical Co. Ltd. As the average particle sizes in the claims are anticipated by the prior art, the prior art is considered close prior art and the rejection is deemed proper.

With regard to the arguments to the rejections under 35 U.S.C. 102(b) as being anticipated by Kamauchi et al. (US 5,538,814), the applicant states that the reference does not teach an active material of lithium crystalline materials and that the submicron particles of the lithium active material are to oxides and not to phosphates.

The applicant's argues that the reference does not teach crystalline materials, however, the reference states that the positive electrode *may* include an amorphous, or non-crystalline oxide. The reference clearly teaches that when a crystalline active material of the invention is used as the positive electrode active material, lithium ions are intercalated at regular intervals in the crystalline structure (column 6, lines 1-20.) When an amorphous structure is used, a greater amount of lithium ions are intercalated at irregular intervals, and that the greater number of sites in the disordered structure produces a higher electrode capacity and, therefore, a battery with a higher energy density. The reference further describes methods to make the material amorphous, such as using an abrupt cooling method, as compared to methods of making a crystalline material. From this, it is clear that the reference teaches embodiments of an active material with a crystalline structure and an amorphous structure, even though it is noted that the amorphous structure is preferred for a lithium active material.

With regard to the applicant's arguments that the reference does not teach submicron particles of lithium active material that are phosphates, the reference teaches a positive active



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material including a compound containing phosphorous with a small ionic radius and a smaller formula amount than that of transition metal (col. 13, lines 10-15.) The reference states that the active material may be one of lithium phosphate, lithium cobalt phosphate, cobalt oxide and lithium cobalt oxide and mixtures thereof (column 2, lines 50-65, column 4, lines 1-52, claims 1-3.) The product is pulverized into an active material having small particle sizes. Claims 1-3 do not state that only oxides have an average particle size of 10 nm -20  $\mu$ m. The reference clearly states that the *active material* has an average particle size of 10 nm -20  $\mu$ m (claims 1-3.)

With regard to the applicant's arguments to the rejection under 35 U.S.C. 103(a) as being unpatentable over Kamauchi et al. (US 5,538,814), it is noted that Kamauchi et al. (US 5,538,814) teaches a lithium secondary battery with a lithium cobalt phosphate active material with an average particle size of 10 nm to 20  $\mu$ m (see claims 1-14.) One of ordinary skill in the art would be motivated to prepare a collection of particles for an electrode material of Kamauchi having particles of the desired average diameter as possible, as the average diameter has been shown to be critical to the invention. Particles of this diameter are taught to increase the capacity of the electrode (col. 5, lines 30-35.) One of ordinary skill in the art has the knowledge, based on Kamauchi, to prepare particles of selected sizes by pulverizing the materials. The grinding of larger particles is taught to provide smaller particles in the nanometer scale range. The applicant has not provided any evidence that the skilled artisan cannot grind the particle to the size of the average particle diameter taught by Kamauchi.

With regard to the applicant's arguments to the rejection under 35 U.S.C. 103(a) as being unpatentable over Bodiger et al. (US 5,849,827), the applicant argues that the particle sizes claims in the reference are not accurate or sensible. Bodiger et al. (US 5,849,827) teaches a

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collection of particles of inorganic powders such as aluminum phosphate. The particles have a mean particle diameter of 1-50 nm (see claims 1-9.) The reference claims sizes less than 95 nm, this limitation is met by the art. The applicant presents atomic radii for various atoms that may preclude particles of the size less than one angstrom in size, however the evidence does not prevent particles of less than 50 nm. Further, the patent is presumed to be valid by the examiner.

***Examiner Correspondence***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mark Ruthkosky whose telephone number is 571-272-1291. The examiner can normally be reached on FLEX schedule (generally, Monday-Thursday from 9:00-6:30.) If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached at 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Mark Ruthkosky  
Primary Patent Examiner  
Art Unit 1745

*Mark Ruthkosky*  
11/19/04